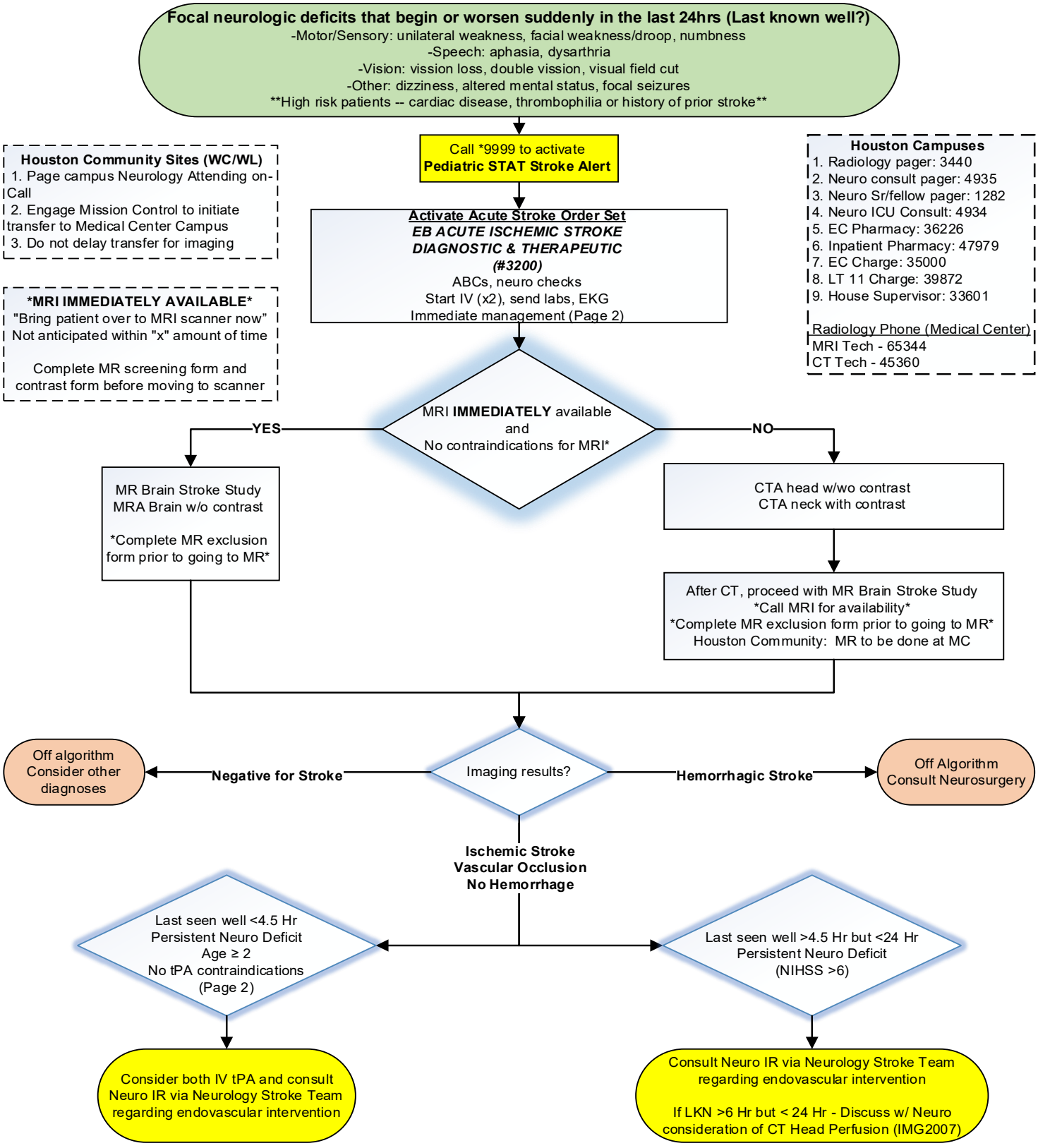
Texas Children's Hospital

TEXAS CHILDREN'S HOSPITAL—HOUSTON CAMPUSES
EVIDENCE BASED OUTCOMES CENTER
CLINICAL ALGORITHM FOR DIAGNOSIS & MANAGEMENT OF SUSPECTED ACUTE ARTERIAL ISCHEMIC STROKE
1ST 24 HOURS AFTER ONSET ALGORITHM



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Immediate management:

- Assess/maintain A,B,C's; frequent VS & neuro checks
- NPO, HOB flat and neck midline
- Initial Labs: Glucose level, CBC with platelets, PT/PTT, INR, fibrinogen, Chem 10, type and screen, Hgb profile (if SCD status unknown)
- Blood pressure: allow autoregulation, avoid hypotension (below 50th%). Consider IV Fluid bolus +/- use of vasopressors. If hemorrhage considered likely, target BP between 50-95th%. Avoid > 10% reduction.
- Obtain EKG, continuous cardiac monitoring and oximetry.
- Maintain oxygen sat ≥95%
- Maintain glucose >80 and <140
- IV fluids: if <1y use D_5NS, if ≥1y use 0.9%NS, consider renal status
- Administer acetaminophen T >100F
- Administer non-sedating anti-seizure medication if seizure(s) occurred
- Signs of increased ICP or decline in level of consciousness: consult neurosurgery

IV tPA contraindications:

HISTORY
- > 4.5 Hr from last seen well
- Patients in whom time of symptom onset is unknown
- Stroke, major head trauma or intracranial surgery in the last 3 months
- History of prior intracranial hemorrhage, known AVM or aneurysm
- Major surgery or parenchymal biopsy within 10 days
- GI or GU bleeding within 21 days
- Patient with neoplasm/malignancy or within one month of completion of treatment for cancer
- Patients with underlying significant bleeding disorder. Patients with mild platelet dysfunction , mild von Willebrand disease or other mild bleeding disorders **ARE NOT** excluded.
- Previously diagnosed primary angiitis of the CNS or secondary arteritis

PATIENT FACTORS
- Patient who would decline a blood transfusion if indicated
- Clinical presentation c/w acute myocardial infarction or post MI pericarditis that requires evaluation by cardiology before treatment
- Arterial puncture at noncompressible site or lumbar puncture w/in last 7 days. Patients who have had cardiac cath via a compressible artery **ARE NOT** excluded.

ETIOLOGY
- Stroke due to SBE, sickle cell disease, meningitis, embolism (bone marrow, air or fat), or moyamoya disease

EXAM
- Persistent systolic blood pressure >15% above the 95th percentile for age while sitting or supine
- Mild deficit (PedNIHSS <6) at start of tPA infusion
- Severe deficit suggesting very large territory stroke pre-tPA
- PedNIHSS >25, regardless of infarct volume seen on imaging

IMAGING
- Symptoms suggestive of SAH even if CT or MRI of head are normal
- CT with hypodensity/sulcal effacement >33% of MCA territory
- Intracranial arterial dissection.

LAB DATA
- Glucose <50 mg/dL (2.78 mmol/L) or >400 mg/dL (22 mmol/L)
- Bleeding diathesis including Platelets <100,000, PT >15 sec (INR >1.4) or elevated PTT > upper limits of the normal range

IV tPA dosing recommendations
(Order - Alteplase bolus and infusion stroke panel)

Bolus dose: 10% of total dose IV over 1 min
Infusion dose: Remaining 90% IV over 1 hour
Total dose: 0.9 mg/kg IV
Max dose: 90 mg

Nurse/MD double checks dose with pharmacy

Acute Blood Pressure Management

- Maintain cardiorespiratory and BP monitoring during infusion
- Systolic BP should be maintained between 50th% for age and 15% above 95th% for age
- Treat to lower BP if >15% above 95th %ile for age for more than 1 hr

OR

- If >20% above 95th% for age at any time

SEE CHART BELOW

Systolic Blood Pressure Parameters - Females

Age	50%	95%	>15% above 95%	>20% above 95%
1-4 years	90	111	128	133
5 years	94	113	130	136
6-10 years	96	121	139	145
11- 18 years	105	131	151	157
>18 years	110	140	161	168

Systolic Blood Pressure Parameters - Males

Age	50%	95%	>15% above 95%	>20% above 95%
1-4 years	90	112	129	134
5 years	95	113	130	136
6-10 years	96	121	139	145
11- 18 years	105	140	161	168
>18 years	110	140	161	168

Blood Pressure Medications

- Labetalol 0.2 mg/kg IV push over 2-3 min, repeat q15 min PRN hypertension
- Consider nicardipine infusion, 0.5 mcg/kg/min, titrate to desired blood pressure

Use with caution in patients with asthma or underlying cardiac disease

Clinical Standards Preparation

This clinical standard was prepared by the Evidence-Based Outcomes Center (EBOC) team in collaboration with content experts at Texas Children's Hospital. Development of this clinical standard supports the TCH Quality and Patient Safety Program initiative to promote clinical standards and outcomes that build a culture of quality and safety within the organization.

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No relevant financial or intellectual conflicts to report.

Development Process

This guideline was developed using the process outlined in the EBOC Manual. The review summary documents the following steps:

1. Review Preparation
   - PICO questions established
   - Evidence search confirmed with content experts

2. Review of Existing Internal and External Guidelines
   - TCH Guideline for Childhood Cerebral Arterial Ischemic Stroke (AIS) and Thrombosis, Stroke in Childhood:

Clinical guidelines for diagnosis, management and rehabilitation, Antithrombotic Therapy in Neonates and Children: American College of Chest Physicians Evidence-Based Clinical Practice Guideline (8th Edition), Management of Stroke in Infants and Children: A Scientific Statement from a Special Writing Group of the American Heart Association Stroke Council and the Council on Cardiovascular Disease in the Young, Antithrombotic and Thrombolytic Therapy for Ischemic Stroke, Guidelines for the Early Management of Adults with Ischemic Stroke: A Guideline from the American Heart Association/American Stroke Association Stroke Council, and the Atherosclerotic Peripheral Vascular Disease and Quality of Care Outcomes in Research Interdisciplinary Working Groups, Antithrombotic and thrombolytic therapy for ischemic stroke: American College of Chest physicians evidence-based clinical practice guidelines (8th Edition). Expansion of the Time Window for Treatment of Acute Ischemic Stroke with Intravenous Tissue Plaminogen Activator: A Science Advisory from the American Heart Association/American Stroke Association

3. Literature Review of Relevant Evidence
   - Searched: PubMed, Cochrane Database
4. Critically Analyze the Evidence
   - 5 Meta-analyses/Systematic reviews
   - 5 Randomized controlled trials
   - 61 non-randomized studies
5. Summarize the Evidence by preparing the guideline, order sets and interdisciplinary plan of care
   - Materials used in the development of guidelines and evidence summaries are maintained in an Acute Ischemic Stroke in Children Evidence-based (EB) review manual with the Quality and Outcomes Center.

Evaluating the Quality of the Evidence

Published clinical guidelines were evaluated for this review using the **AGREE II** criteria. The summary of these guidelines are included in the literature appraisal. AGREE II criteria evaluate Guideline Scope and Purpose, Stakeholder Involvement, Rigor of Development, Clarity and Presentation, Applicability, and Editorial Independence using a 4-point Likert scale. The higher the score, the more comprehensive the guideline.

This clinical standard specifically summarizes the evidence *in support of* or *against* specific interventions and identifies where evidence is *lacking/inconclusive*. The following categories describe how research findings provide support for treatment interventions.
"Evidence Supports" provides evidence to support an intervention
"Evidence Against" provides evidence against an intervention.
"Evidence Lacking/Inconclusive" indicates there is insufficient evidence to support or refute an intervention and no conclusion can be drawn *from the evidence.*
The **GRADE** criteria were utilized to evaluate the body of evidence used to make practice recommendations. The table below defines how the quality of the evidence is rated and how a strong versus weak recommendation is established. The literature appraisal reflects the critical points of evidence.

Recommendation	
STRONG	Desirable effects clearly outweigh undesirable effects or vice versa
WEAK	Desirable effects closely balanced with undesirable effects
Quality	**Type of Evidence**
High	Consistent evidence from well-performed RCTs or exceptionally strong evidence from unbiased observational studies
Moderate	Evidence from RCTs with important limitations (e.g., inconsistent results, methodological flaws, indirect evidence, or imprecise results) or unusually strong evidence from unbiased observational studies
Low	Evidence for at least 1 critical outcome from observational studies, RCTs with serious flaws or indirect evidence
Very Low	Evidence for at least 1 critical outcome from unsystematic clinical observations or very indirect evidence

Recommendations

Practice recommendations were directed by the existing evidence and consensus amongst the content experts. Patient and family preferences were included when possible. The Content Expert Team and EBOC team remain aware of the controversies in the diagnosis/management of acute arterial ischemic stroke in children. When evidence is lacking, options in care are provided in the clinical standard and the accompanying order sets (if applicable).

Approval Process

Clinical standards are reviewed and approved by hospital committees as deemed appropriate for its intended use. Clinical standards are reviewed as necessary within EBOC at Texas Children's Hospital. Content Expert Teams are involved with every review and update.

Disclaimer

Practice recommendations are based upon the evidence available at the time the clinical standard was developed. Clinical standards (guidelines, summaries, or pathways) do not set out the standard of care and are not intended to be used to dictate a course of care. Each physician/practitioner should use his or her independent judgment in the management of any specific patient and is responsible, in consultation with the patient and/or the patient's family, to make the ultimate judgment regarding care.

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Version History

Date	Action	Comments
	Created	No comments
Jan 2019	Update	No comments
Feb 2026	Update; Algorithm updated and additional algorithm created for Austin	No Comments